WHAT IS CLAIMED:

1. A method of fabricating an optical waveguide comprising:

depositing a hard mask on a first cladding layer of a substrate, the hard mask partially covering the first cladding layer while leaving an uncoated area, the uncoated area having a first end and a second end, the first end being wider than the second end;

forming a first trench having first and second ends in general alignment with the first and second ends of the uncoated area and with the first end of the first trench being wider and deeper than the second end of the first trench;

filling the first trench with core material;

forming a second trench in the core material with first and second ends in general alignment with the first and second ends of the first trench and with the second end of the second trench being deeper than the first end of the second trench.

2. The method if claim 1 wherein

the forming of the first trench is carried out by reactive ion etching the uncoated area under conditions sufficient to permit RIE lag to occur; and

the forming of the second trench is carried out by reactive ion etching the core material under conditions sufficient to permit reverse RIE lag to occur.

3. The method of claim 1 further comprising:

removing the hard mask.

4. The method of claim 1 further comprising

planarizing the core material after filling the first trench with the core material and prior to the reactive ion etching of the core material.

5. The method of claim 2 wherein the reactive ion etching of the uncoated area is carried out in a chamber with a first source power and the reactive ion etching of the core material is carried out in the chamber with a second source power, the first source power being different than the second source power.

6. The method of claim 2 wherein the reactive ion etching of the uncoated area is carried out in a chamber at a first pressure and the reactive ion etching of the

core material is carried out in the chamber at a second pressure, the first pressure being different than the second pressure.

7. The method of claim 2 wherein the reactive ion etching of the uncoated area is carried out in a chamber at a first ion energy and the reactive ion etching of the core material is carried out in the chamber at a second ion energy, the first ion energy being different than the second ion energy.

8. The method of claim 2 wherein the reactive ion etching of the uncoated area is carried out with a first ratio of etch gas flow rate to additive gas flow rate and the reactive ion etching of the core material is carried out with a second ratio of etch gas flow rate to additive gas flow rate, the first ratio being different from the second ratio.

9. The method of claim 2 wherein the reactive ion etching of the uncoated area is carried out with a first total flow rate of etch gas and additive gas and the reactive ion etching of the core material is carried out with a second total flow rate of etch gas and additive gas, the first total flow rate being different than the second total flow rate.

10. The method of claim 9 wherein the reactive ion etching of the uncoated area is carried out with a first total flow rate of etch gas and additive gas and the reactive ion etching of the core material is carried out with a second total flow rate of etch gas and additive gas, the first total flow rate being different than the second total flow rate.

11. The method of claim 2 wherein the reaction ion etching of the uncoated area is carried out using a first lower electrode power and the reactive ion etching at the core material is carried out using a second lower electrode power, the first lower electrode power being different than the second lower electrode power.

12. The method of claim 1 wherein the first cladding layer is selected from the group consisting of SiO_2, SiON, Si_3N_4, $LiNbO_3$, polymers, and ferroelectric materials.

13. The method of claim 12 wherein the core material is selected from the group consisting of SiO_2, SiON, Si_3N_4, $LiNbO_3$, polymers, and ferroelectric materials.

14. The method of claim 1 further comprising depositing a second cladding layer on top of the core and first cladding layer after removing the hard mask.

15. The method of claim 14 wherein the second cladding layer is selected from the group consisting of SiO_2, SiON, Si_3N_4, $LiNbO_3$, polymers, and ferroelectric materials.

16. The method of claim 15 wherein the core comprises a first polymer and the second cladding layer comprises a second polymer, the first and second polymers having differing refractive indices.

17. The method of claim 1 wherein the core comprises a first doped silica and the second cladding layer comprises a second doped silica, the first and second doped silicas having differing refractive indices.

18. A three-dimensional optical waveguide comprising:

a substrate coated with a first cladding layer,

the first cladding layer comprising a three dimensional trench having a peripheral boundary including a first end and a second end, the first end of the trench being wider and deeper than the second end of the trench, the trench being partially filled with core material so that a height of the core material at the first end of trench is greater than a height of the core material at the second end of the trench,

the core material and first cladding layer being covered by a second cladding layer.

19. The optical wave guide of claim 18 further comprising an optical fiber having an end connected to the first cladding layer and aligned with the first end of the trench.

20. The optical wave guide of claim 19 wherein optical fiber has a diameter ranging from about 8 μm to about 9 μm and a width of the first end of the trench ranges from about 8 μm to about 9 μm.

21. The optical wave guide of claim 20 wherein the diameter of the fiber substantially matches the width of the first end of the trench.

22. The optical wave guide of claim 18 wherein the core comprises a first polymer and the second cladding layer comprises a second polymer, the first and second polymers having differing refractive indices.

23. The optical wave guide of claim 18 wherein the core comprises a first doped silica and the second cladding layer comprises a second doped silica, the first and second doped silicas having differing refractive indices.

24. A method of fabricating an optical waveguide comprising:

depositing a hard mask on a first cladding layer of a substrate, the hard mask partially covering the first cladding layer while leaving an uncoated area, the uncoated area having a peripheral boundary including a first end and a second end, the first end being wider than the second end;

reactive ion etching the uncoated area under conditions sufficient to permit RIE lag to occur so as to form a first trench having first and second ends in general alignment with the first and second ends of the uncoated area and with the first end of the first trench being deeper than the second end of the first trench;

filling the first trench with core material;

planarizing the core material;

reactive ion etching the core material under conditions sufficient to permit reverse RIE lag to occur so as to form a second trench in the core material with first and second ends in general alignment with the first and second ends of the first trench and with the second end of the second trench being deeper than the first end of the second trench;

removing the hard mask;

coating the core and first cladding layer with a second cladding layer.

25. The method of claim 24 wherein the reactive ion etching of the uncoated area is carried out in a chamber with a first source power and the reactive ion etching of the core material is carried out in the chamber with a second source power, the first source power being different than the second source power.

26. The method of claim 24 wherein the reactive ion etching of the uncoated area is carried out in a chamber at a first pressure and the reactive ion etching of the core material is carried out in the chamber at a second pressure, the first pressure being different than the second pressure.

27. The method of claim 24 wherein the reactive ion etching of the uncoated area is carried out in a chamber at a first ion energy and the reactive ion etching of the core material is carried out in the chamber at a second ion energy, the first ion energy being different than the second ion energy.

28. The method of claim 24 wherein the reactive ion etching of the uncoated area is carried out with a first ratio of etch gas flow rate to additive gas flow rate and the reactive ion etching of the core material is carried with a second ratio of etch gas flow rate to additive gas flow rate, the first ratio being different from the second ratio.

29. The method of claim 24 wherein the reactive ion etching of the uncoated area is carried out with a first total flow rate of etch gas and additive gas and the reactive ion etching of the core material is carried out with a second total flow rate of etch gas and additive gas, the first total flow rate being different than the second total flow rate.

30. The method of claim 24 wherein the reaction ion etching of the uncoated area is carried out using a first lower electrode power and the reactive ion etching at the core material is carried out using a second lower electrode power, the first lower electrode power being different than the second lower electrode power.